CLAIMS

1. Method of providing a radio frequency output signal (55), comprising the steps of:

determining an instantaneous size measure of an input signal (35), said size measure being an amplitude or therefrom derivable quantity;

deriving a drive signal (26) from said input signal (35);

providing a bias signal (36), being dependent on said instantaneous size measure; and

amplifying said drive signal (26) using a bias level according to said bias signal (36) into said radio frequency output signal (55);

characterized in that

said bias signal (36) dependency on said instantaneous size measure gives rise to an increased nonlinearity in said amplifying step.

2. Method according to claim 1, **characterized in that** said bias signal (36) gives an amplification according to one of class C and class B for instantaneous size measures within a first amplitude range, and said bias signal (36) being higher than class B amplification for instantaneous size measures above said first amplitude range.

3. Method according to claim 2, **characterized in that** said bias signal (36) is controlled to give essentially a class A bias level at maximum amplitude.

4. Method according to any of the claims 1 to 3, **characterized in that** said bias signal providing step is controlled for producing a predetermined output characteristics, whereby a bias signal amplitude-averaged over an amplitude interval comprising all amplitudes in an entire amplitude range supported by said amplifying step above a first amplitude is higher than a bias signal amplitude-averaged over said entire amplitude range.

5. Method according to any of the claims 1 to 4, **characterized in that** said deriving step comprises the step of modifying said input signal (35).

6. Method according to claim 5, **characterized in that** said deriving step comprises the step of pre-distorting said input signal (35) dependent (47) on said instantaneous size measure.

7. Method according to claim 5, **characterized in that** said deriving step comprises the step of modifying said input signal (35) by a feedback arrangement.

8. Method according to any of the claims 1 to 7, **characterized in that** said bias signal (36) is controlled to, for all amplitudes within a first amplitude range (11), increase with increasing amplitude.

9. Method according to any of the claims 1 to 8, **characterized in that** said bias signal (36) is controlled to be, for all amplitudes within a second amplitude range (12), lower than said bias signal amplitude-averaged over said entire amplitude range.

10. Method according to claim 8 or 9, **characterized in that** said first amplitude range (11) comprises maximum amplitude.

11. Method according to claim 6, **characterized by** the further steps of:

selecting a pre-distortion function having a predetermined bandwidth; and

adapting bias signal (36) according to said pre-distortion function.

12. Method according to claims 11, **characterized in that** said pre-distortion function contains predominantly low-order components.

13. Method according to any of the claims 6, 11 or 12, **characterized by** the further steps of:

selecting said bias signal (36) according to predetermined relations; and

adapting said pre-distortion function according to said bias signal (36).

14. Method according to any of the claims 1 to 13, **characterized in that** said output characteristics, at least for a third amplitude range (13), is linear.

15. Method according to claim 14, **characterized in that** said output characteristics is substantially linear over the entire amplitude range.

16. Method according to any of the claims 1 to 13, **characterized in that** said output characteristics comprises a substantially zero output signal within a fourth amplitude range (14).

17. Method according to any of the claims 1 to 16, **characterized by** the further steps of:

determining a feedback signal (46) of said radio frequency output signal (55); and

adapting said drive signal (26) and/or said bias signal (36) according to said feedback signal (46).

18. Method according to claim 6, **characterized by** the further steps of:

causing said pre-distorting and bias signal providing steps to be simultaneous at the input of said amplification.

19. Method according to claim 18, **characterized in that** said causing step in turn comprises at least one of the steps of:

inverse filtering of said drive signal (26) with respect to a first signal path (51) to an amplifying element (50);

delay compensation of said drive signal (26) with respect to said first signal path (51) to an amplifying element (50);

inverse filtering of said bias signal (36) with respect to a second signal path (52) to said amplifying element (50); and

delay compensation of said bias signal (36) with respect to said second signal path (52) to said amplifying element (50).

20. Method according to any of the claims 1 to 19, **characterized by** the further step of:

compensating current saturation at high amplitude end.

21. Use of a method according to any of the claims 1 to 20 in a radio frequency amplifier arrangement of a type selected from the list of:

Doherty amplifier arrangement (60);

Chireix amplifier arrangement; and

amplifier arrangements using envelope and restoration enhancement techniques.

22. Radio frequency power amplifier (2; 62, 64), comprising:

input signal terminal (19);

input detector (40) arranged to determine an instantaneous size measure of a signal (35) on said input signal terminal (19), said size measure being an amplitude or therefrom derivable quantity;

drive signal deriving means (20) connected to said input signal terminal (19), providing a drive signal (26);

bias signal generator (30) providing a bias signal (36), said bias signal generator (30) being connected to said input detector (40) and being controlled dependent (47) on said instantaneous size measure;

amplifying element (50), connected to said drive signal deriving means (20) and said bias signal generator (30);

characterized in that

said bias signal generator (36) being controlled to gives rise to an increased nonlinearity in said amplifying element (50).

23. Radio frequency power amplifier according to claim 22, **characterized in that** said bias signal generator (30) is arranged to give an amplification in said amplifying element (50) according to one of class C and class B for

instantaneous size measures within a first amplitude range, and to give a bias signal (36) being higher than class B amplification for instantaneous size measures above said first amplitude range.

24. Radio frequency power amplifier according to claim 22 or 23, **characterized in that** said bias signal generator (30) is arranged to give a bias signal amplitude-averaged over an amplitude interval comprising all amplitudes in an entire amplitude range supported by said amplifying element (50) above a first amplitude is higher than a bias signal amplitude-averaged over said entire amplitude range.

25. Radio frequency power amplifier according to any of the claims 22 to 24, **characterized in that** said drive signal deriving means comprises pre-distorting means (20) connected to said input detector (40), being controlled dependent (47) on said instantaneous size measure.

26. Radio frequency power amplifier according to any of the claims 22 to 25, **characterized in that** said bias signal generator (30) in turn comprises means giving a bias signal (36), which for all amplitudes within a first amplitude range (11), increase with increasing amplitude.

27. Radio frequency power amplifier according to any of the claims 22 to 26, **characterized in that** said bias signal generator (30) in turn comprises means giving a bias signal (36), which for all amplitudes within a second amplitude range (12), is lower than an amplitude-averaged bias signal (16).

28. Radio frequency power amplifier according to claim 25, **characterized by** further comprising:

feed-back arrangement (48), in turn comprising a feedback sensor (41) monitoring said output of said amplifier element (50) and adaptation means (44) connected said bias signal generator (30) and said pre-distortion means (20) for providing said bias signal generator (30) and said pre-distortion means (20) with a feedback signal (53, 54);

said bias signal generator (30) and said pre-distortion means (20) being arranged to adapt their actions according to said feedback signal (53, 54).

29. Radio frequency power amplifier according to any of the claims 22 to 28, **characterized by** further comprising:

simultaneousness-causing means (21, 31) for causing said drive signal (26) and bias signal (36) to be simultaneous at in input of said amplifying element (50).

30. Radio frequency power amplifier according to claim 29, **characterized in that** said coincidence causing means in turn comprises at least one of:

inverse filter (21) connected between said pre-distortion means (20) and said amplifying element (50), for compensating for a first signal path (51) to said amplifying element (50); and

inverse filter (31) connected between said bias signal generator (30) and said amplifying element (50), for compensating for a second signal path (52) to said amplifying element (50).

31. Composite radio frequency power amplifier (60), **characterized by** comprising at least one radio frequency power amplifier (2; 62, 64) according to any of the claims 22 to 30 as a sub-amplifier.

32. Composite radio frequency power amplifier according to claim 31, **characterized in that** said composite radio frequency power amplifier is selected from the list of:

Doherty amplifier arrangement (60);

Chireix amplifier arrangement; and

amplifier arrangements using envelope elimination and restoration techniques.

33. Transmitter, having a radio frequency power amplifier (2; 62, 64), said radio frequency power amplifier (2; 62, 64) comprising:

input signal terminal (19);

input detector (40) arranged to determine an instantaneous size measure of a signal (35) on said input signal terminal (19), said size measure being an amplitude or therefrom derivable quantity;

drive signal deriving means (20) connected to said input signal terminal (19), providing a drive signal (26);

bias signal generator (30) providing a bias signal (36), said bias signal generator (30) being connected to said input detector (40) and being controlled dependent (47) on said instantaneous size measure;

amplifying element (50), connected to said drive signal deriving means (20) and said bias signal generator (30);

characterized in that

said bias signal generator (36) being controlled to gives rise to an increased nonlinearity in said amplifying element (50).

34. Transmitter according to claim 33, **characterized in that** said bias signal generator (30) is arranged to give an amplification in said amplifying element (50) according to one of class C and class B for instantaneous size measures within a first amplitude range, and to give a bias signal (36) being higher than class B amplification for instantaneous size measures above said first amplitude range.

35. Transmitter according to claim 33 or 34, **characterized in that** said bias signal amplitude-averaged over an amplitude interval comprising all amplitudes in an entire amplitude range supported by said amplifying element (50) above a first amplitude is higher than a bias signal amplitude-averaged over said entire amplitude range.

36. Transmitter according to any of the claims 33 to 35, **characterized in that** said drive signal deriving means comprises pre-distorting means (20) connected to said input detector (40), being controlled dependent (47) on said instantaneous size measure.

37. Transmitter according to any of the claims 33 to 36, **characterized in that** said bias signal generator (30) in turn comprises means giving a bias signal (36), which for all amplitudes within a first amplitude range (11), increase with increasing amplitude.

38. Transmitter according to any of the claims 33 to 37, **characterized in that** said bias signal generator (30) in turn comprises means giving a bias signal (36), which for all amplitudes within a second amplitude range (12), is lower than an amplitude-averaged bias signal (16).

39. Transmitter according to claim 38, **characterized in that** said second amplitude range (12) covers at least half the amplitude distribution (15).

40. Transmitter according to claim 38 or 39, **characterized in that** said pre-distortion means (20) comprises means for making said drive signal (26) larger than said input signal (35) at least in said second amplitude range (12).

41. Wireless communication system (1), having a radio frequency power amplifier (2; 62,64), said radio frequency power amplifier (2; 62, 64) comprising:

input signal terminal (19);

input detector (40) arranged to determine an instantaneous size measure of a signal (35) on said input signal terminal (19), said size measure being an amplitude or therefrom derivable quantity;

drive signal deriving means (20) connected to said input signal terminal (19), providing a drive signal (26);

bias signal generator (30) providing a bias signal (36), said bias signal generator (30) being connected to said input detector (40) and being controlled dependent (47) on said instantaneous size measure;

amplifying element (50), connected to said drive signal deriving means (20) and said bias signal generator (30);

characterized in that

amplifying element (50), connected to said drive signal deriving means (20) and said bias signal generator (30);

characterized in that

said bias signal generator (36) being controlled to gives rise to an increased nonlinearity in said amplifying element (50).
